

**WHAT IS CLAIMED IS:**

1. An imaging arrangement for imaging an optical code or target at a plurality of focal planes comprising:

at least one one-dimensional image sensor array each having at least one row of pixels  
 5 for obtaining at least one row of pixel data corresponding to an image focused thereon; and  
 a lens assembly having at least one objective lens positioned along an optical axis of the imaging arrangement for focusing an image of the optical code or target on the at least one one-dimensional image sensor array for obtaining one of a row or two rows of pixel data corresponding to at least a portion of the optical code or target, wherein a plane of the optical  
 10 code or target is correlated in space to at least one of the plurality of focal planes.

2. The imaging arrangement according to Claim 1, wherein the optical code or target is selected from the group consisting of a barcode symbol, a label, a marking, and a picture.

3. The imaging arrangement according to Claim 2, wherein the barcode symbol is  
 15 one of a one-dimensional and a two-dimensional barcode symbol.

4. The imaging arrangement according to Claim 1, wherein the imaging arrangement has a working range in the range of approximately 5cm to 102cm.

5. The imaging arrangement according to Claim 1, further comprising an actuator operatively coupled to a carrier housing the at least one objective lens for moving the carrier  
 20 along the optical axis.

6. The imaging arrangement according to Claim 5, wherein the carrier is moved in the range of 0-100 $\mu$ m by the actuator.

7. The imaging arrangement according to Claim 1, wherein the lens assembly includes a plurality of optical elements for further focusing the image on the at least one one-dimensional image sensor array.

8. The imaging arrangement according to Claim 7, wherein the plurality of  
5 optical elements are selected from the group consisting of glass, lens, holographic optical elements, plastic, and other transparent materials.

9. The imaging arrangement according to Claim 7, wherein the plurality of optical elements overlay at least a portion of the at least one one-dimensional image sensor array.

10. The imaging arrangement according to Claim 7, further comprising a carrier  
10 having a plurality of segments, wherein each of the plurality of optical elements is provided at a corresponding one of the plurality of segments.

11. The imaging arrangement according to Claim 10, wherein one of the plurality  
of segments is an open segment and does not include an optical element, and further  
15 comprising a motor operatively coupled to the carrier for positioning the open segment or one of the plurality of optical elements along the optical axis.

12. The imaging arrangement according to Claim 1, further comprising:  
  
an actuator operatively coupled to a first carrier housing the at least one objective lens  
for moving the first carrier along the optical axis; and  
  
20 a motor operatively coupled to a second carrier having a plurality of optical elements,  
wherein the actuator and motor can be operated simultaneously and non-simultaneously for  
moving the first carrier and the second carrier simultaneously and non-simultaneously,

respectively, for further focusing the image on the at least one one-dimensional image sensor array.

13. An imaging arrangement for imaging an optical code or target at a plurality of focal planes comprising:

5 a one-dimensional image sensor array having a row of pixels for obtaining a row of pixel data corresponding to an image focused thereon; and

a lens assembly having at least one objective lens positioned along an optical axis of the imaging arrangement for focusing an image of the optical code or target on the one-dimensional image sensor array for obtaining a row of pixel data corresponding to at least a  
10 portion of the optical code or target, wherein a plane of the optical code or target is correlated in space to at least one of the plurality of focal planes.

14. The imaging arrangement according to Claim 13, wherein the imaging arrangement has a working range in the range of approximately 5cm to 102cm.

15. The imaging arrangement according to Claim 13, further comprising an  
15 actuator operatively coupled to a carrier housing the at least one objective lens for moving the carrier along the optical axis.

16. An imaging arrangement for imaging an optical code or target at a plurality of focal planes comprising:

two one-dimensional image sensor arrays each having at least one row of pixels for  
20 obtaining at least one row of pixel data corresponding to an image focused thereon; and

a lens assembly having at least one objective lens positioned along an optical axis of the imaging arrangement for focusing an image of the optical code or target on the two one-dimensional image sensor arrays for obtaining two rows of pixel data corresponding to at

least a portion of the optical code or target, wherein a plane of the optical code or target is correlated in space to at least one of the plurality of focal planes.

17. The imaging arrangement according to Claim 16, wherein the imaging arrangement has a working range in the range of approximately 5cm to 102cm.

5 18. The imaging arrangement according to Claim 16, wherein the lens assembly includes a plurality of optical elements for further focusing the image on at least one of the two one one-dimensional image sensor arrays.

19. The imaging arrangement according to Claim 18, wherein the plurality of optical elements are selected from the group consisting of glass, lens, holographic optical  
10 elements, plastic, and other transparent materials.

20. The imaging arrangement according to Claim 18, wherein the plurality of optical elements overlay at least a portion of at least one of the two one-dimensional image sensor arrays.

21. An imaging arrangement for imaging an optical code or target at a plurality of  
15 focal planes comprising:

a one-dimensional image sensor array having at least one row of pixels for obtaining a row of pixel data corresponding to an image focused thereon; and

a lens assembly having at least one objective lens positioned along an optical axis of the imaging arrangement and a carrier having a plurality of optical elements configured for  
20 positioning at least one of the plurality of optical elements along the optical axis for focusing an image of the optical code or target on the one-dimensional image sensor array for obtaining a row of pixel data corresponding to at least a portion of the optical code or target, wherein a plane of the optical code or target is correlated in space to at least one of the plurality of focal planes.

22. The imaging arrangement according to Claim 21, wherein the imaging arrangement has a working range in the range of approximately 5cm to 102cm.

23. The imaging arrangement according to Claim 21, wherein the plurality of optical elements are selected from the group consisting of glass, lens, holographic optical  
5 elements, plastic, and other transparent materials.

24. The imaging arrangement according to Claim 21, further comprising:  
  
an actuator operatively coupled to a first carrier housing the at least one objective lens for moving the first carrier along the optical axis; and

a motor operatively coupled to a second carrier having the plurality of optical  
10 elements, wherein the actuator and motor can be operated simultaneously and non-simultaneously for moving the first carrier and the second carrier simultaneously and non-simultaneously, respectively, for focusing the image on the one-dimensional image sensor array.

25. A barcode imager for imaging an optical code or target at a plurality of focal  
15 planes comprising:

means for initiating an imaging operation for imaging the optical code or target at at least one of the plurality of focal planes; and

an imaging arrangement comprising:  
  
at least one one-dimensional image sensor array each having at least one row  
20 of pixels for obtaining at least one row of pixel data corresponding to an image of the optical code or target during the imaging operation; and

a lens assembly having at least one objective lens positioned along an optical axis of the imaging arrangement for focusing the image on the at least one one-dimensional

image sensor array during the imaging operation for obtaining one of a row or two rows of pixel data corresponding to at least a portion of the optical code or target, wherein a plane of the optical code or target is correlated in space to at least one of the plurality of focal planes.

26. The barcode imager according to Claim 25, wherein the optical code or target  
5 is selected from the group consisting of a barcode symbol, a label, a marking, and a picture.

27. The barcode imager according to Claim 26, wherein the barcode symbol is one of a one-dimensional and a two-dimensional barcode symbol.

28. The barcode imager according to Claim 25, wherein the imaging arrangement has a working range in the range of approximately 5cm to 102cm.

10 29. The barcode imager according to Claim 25, wherein the imaging arrangement further comprises an actuator operatively coupled to a carrier housing the at least one objective lens for moving the carrier along the optical axis.

30. The barcode imager according to Claim 29, wherein the carrier is moved in the range of 0-100 $\mu$ m by the actuator.

15 31. The barcode imager according to Claim 25, wherein the lens assembly includes a plurality of optical elements for further focusing the image on the at least one one-dimensional image sensor array.

32. The barcode imager according to Claim 31, wherein the plurality of optical elements are selected from the group consisting of glass, lens, holographic optical elements,  
20 plastic, and other transparent materials.

33. The barcode imager according to Claim 31, wherein the plurality of optical elements overlay at least a portion of the at least one one-dimensional image sensor array.

34. The barcode imager according to Claim 31, wherein the imaging arrangement further comprises a carrier having a plurality of segments, wherein each of the plurality of optical elements is provided at a corresponding one of the plurality of segments.

35. The barcode imager according to Claim 34, wherein one of the plurality of  
5 segments is an open segment and does not include an optical element, and wherein the imaging arrangement further comprises a motor operatively coupled to the carrier for positioning the open segment or one of the plurality of optical elements along the optical axis.

36. The barcode imager according to Claim 25, wherein the imaging arrangement further comprises:

10 an actuator operatively coupled to a first carrier housing the at least one objective lens for moving the first carrier along the optical axis; and

a motor operatively coupled to a second carrier having a plurality of optical elements, wherein the actuator and motor can be operated simultaneously and non-simultaneously for moving the first carrier and the second carrier simultaneously and non-simultaneously, respectively, for further focusing the image on the at least one one-  
15 dimensional image sensor array.

37. The barcode imager according to Claim 25, further comprising:

a memory for storing rows of pixel data corresponding to different portions of the optical code or target; and

20 a processor for processing the stored rows of pixel data

38. The barcode imager according to Claim 25, wherein the at least one of the plurality of focal planes is an optimal focal plane.

39. The barcode imager according to Claim 25, wherein the at least one of the plurality of focal planes is at least one focal plane proximally or distally located from an optimal focal plane.

40. The barcode imager according to Claim 25, further comprising means for  
5 focusing different sets of the plurality of focal planes on the at least one one-dimensional imager sensor array.

41. The barcode imager according to Claim 40, wherein the means for focusing different sets of the plurality of focal planes includes an actuator operatively coupled to a carrier housing the at least one objective lens for moving the carrier along the optical axis.

10 42. The barcode imager according to Claim 40, wherein the means for focusing different sets of the plurality of focal planes includes a motor operatively coupled to a carrier having a plurality of optical elements, and wherein said motor is capable of positioning each of the plurality of optical elements along the optical axis.

43. A method for imaging an optical code or target at a plurality of focal planes  
15 comprising the steps of:

initiating an imaging operation for imaging the optical code or target at at least one of the plurality of focal planes onto at least one one-dimensional image sensor array via at least one objective lens; and

obtaining one of a row and two rows of pixel data corresponding to the optical code or  
20 target during the imaging operation.

44. The method according to Claim 43, further comprising the steps of:  
determining whether at least one row of pixel data can be decoded and/or processed;  
and



decoding and/or processing a row of pixel data if it is determined that at least one row of pixel data can be decoded and/or processed.

45. The method according to Claim 44, further comprising the steps of:

moving the at least one objective lens if it is determined that at least one row of pixel

5 data cannot be decoded and/or processed; and

repeating the initiating, obtaining and determining steps, and one of the decoding and moving steps, until the at least one row of pixel data is decoded and/or processed.

46. The method according to Claim 43, further comprising the steps of:

moving the at least one objective lens;

10 repeating the initiating, obtaining and moving steps, until the at least one objective lens has been moved through every position; and

decoding and/or processing at least one row of obtained pixel data.

47. The method according to Claim 43, further comprising the steps of:

storing the row of pixel data;

15 repeating the initiating and storing steps until a plurality of rows of pixel data corresponding to the optical code or target are stored; and

decoding and/or processing the plurality of stored rows of pixel data.

48. The method according to Claim 43, wherein the optical code or target is selected from the group consisting of a barcode symbol, a label, a marking, and a picture.

20 49. The method according to Claim 48, wherein the barcode symbol is one of a one-dimensional and a two-dimensional barcode symbol.

50. The method according to Claim 43, further comprising the step of positioning at least one optical element between the at least one objective lens and the at least one one-dimensional image sensor array.

51. The method according to Claim 50, wherein the at least one optical element is selected from the group consisting of glass, lens, holographic optical elements, plastic, and other transparent materials.

52. The method according to Claim 50, wherein the at least one optical element  
5 overlays at least a portion of the at least one one-dimensional image sensor array.